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Impact of some Amino Acids on Vegetative Parameters, Flowering and Chemical Constituents of Dahlia Cut Flowers

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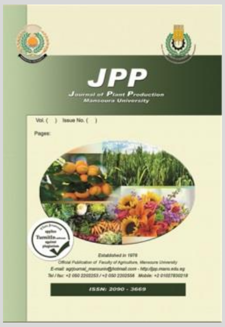

ABSTRACT

The present research was accomplished during the two consecutive seasons of 2017-2018 and 2018-2019 at the Baramoon Experimental Research field, Dakahlia Governorate, Hort. Res. Institute, Agric. Res. Center, Ministry of Agric., Egypt. Therefore, an experiment was undertaken to examine the best treatment of some amino acids (Tryptophan, Arginine, Glycine and combination between them) as foliar usage at concentration of 100 ppm, beside the control treatment on enhancing vegetative characteristics, flowering and chemical constituents of dahlia (*Dahlia pinnata* L.) cut flowers (local variety). The results demonstrated that application of dahlia plants with a mixture of amino acids at 100 ppm as a foliar, accorded the highest plant height (81.1 - 86.0 cm), number of inflorescences (63.0 - 66.6), inflorescences fresh weight (15.59 - 16.70 g), inflorescence diameter (12.3 - 12.6 cm), total chlorophyll, total carbohydrates in leaves and flowers, N, P and K contents in the leaves. In addition, arginine at 100 ppm registered proclaimed considerable rates in vegetative and flowering parameters, pursued by plants sprayed by glycine in number of flowers then tryptophan in both seasons, respectively. The weakest values were obtained from untreated plants (control) in both seasons.

Keywords: *Dahlia pinnata* L., Amino acids, Tryptophan, Arginine, Glycine

INTRODUCTION

Dahlia (*Dahlia pinnata* L.) is an extremely appreciated flowering bulb native to Family Asteraceae (Compositeae) and consisting of 35 species with more than one thousand distinct cultivars all over the world (Vinayananda, 1994). The embellishing value of dahlia is colorful inflorescences with fascinating petals of varies colors, sizes and shapes (Jimenez Marina, 2015). Dahlias are native to montane zone of Mexico. It is commonly sown as bedding plant (Marcinek *et al*., 2019). Ultimate varieties are planted by seeds, however the considerable cultivars are reproduced by tubers or stem cuttings (Hobbs and Hatch, 1994). It is a half hardy, perennial herbaceous plant with tuberous root system and erect growing habit. Also, it has different flowers types, including ball like forms, orchid and anemone forms. In addition, it supplies several flower colors, beside the single flower with two colors. Its major uses important like garden displays and/or a beautiful cut flower (Otani *et al*., 2013).

Amino acids are precursors of growth substances and phytohormones. Additionally, they act as building blocks for synthesis of protein, through forming the organic nitrogenous compounds (Davies, 1982). Moreover, amino acids are especially important for energizing the cell growth, buffering a convenient pH value inside the cells. As they carry both basic and acid groups. Also, amino acids protect the plant cells from excess ammonia which causes a dangerous toxicity by removing it outside the cells (Smith, 1982). Besides that, they have important functions in the biosynthesis of many organic compounds process like, alkaloids, pigments, enzymes, vitamins, coenzymes, terpenoids, pyrimidine and purine bases (Kamar and Omar, 1987).

Tryptophan is considered an efficient physiological precursor of auxin synthesis in higher plants, it is low cost and nontoxic substance that can be exogenously applied to plants to elicit an auxin response, thus has indirect role on plant growth. Also, Woodward and Bartel (2005) notified that alternate pathway of IAA synthesis within plants, all flight from Tryptophan. Thus, supplying the plants by tryptophan, lead in the end to build and produce indole acetic acid (IAA).

Arginine is one of the extreme practically varied amino acids and a precursor for polyamines biosynthesis which created by arginine decarboxylation through decarboxylase of arginine for producing putrescine (Bouchereau *et al*., 1999). Arginine plays as a vital precursor for polyamines which protect the plants especially in the stress times and increasing the plant vigor and yield (Miller *et al*., 2007). This also were reported by many researchers, since they notified the favorable function of arginine in relieving the suppression which take place as a result for consequence exhibit plants to stress (Hassanein *et al*., 2008 and Khalil *et al*., 2009).

Glycine is the extreme widespread amino acid applied in the plant uptake researches, while it is intellect to be especially paramount like a nitrogen exporter for the plants in order that its low carbon to nitrogen ratio, low molecular weight and it inhibits the apparent photo-respiration done by C_3 (Zeiger, 2010). It stimulates the synthesis of chlorophyll and it activates the vegetative growth and it has a role in the

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process of photosynthesis and handling stressful situations that occur after the flowers picked.

Amino acids have the uttermost value in the plant feeding for earning big yields with high characteristics and dereliction of the copious rotation with superior dry mater. It produces more considerable and symmetrical flowering (Bidwell, 1997). Zedan (2000) indicated that spraying *Carum carvi* and *Coriandrum sativum* plants with 50 ppm tryptophan increased plant height, branching and total chlorophylls. Mahgoub *et al*. (2011) found that spraying *Dahlia pinnata* plants with putrescine and thiamine at 50, 100 and 150 ppm gave a significant increase in the following parameters; plant height, number of branches, number of leaves and stem diameter, number of flowers, flower diameter, fresh and dry weight of flowers and chlorophyll content compared with control treatment. Youssef (2014) specified that glutamic acid and tryptophan (each at 200 mg/l) plus or Zn, Fe and Mn (each at 150 mg/l) in addition to their interactions significantly improved branches number, herb dry and fresh weights and the height of *Echinacea purpurea* plants. Wahba *et al*. (2015) demonstrated that amino acid usage (tyrosine, tryptophan and glutamic) at varies doses (0, 50, 100 and 150 mg/l) produced a significant increase in growth and yield characters (branches number, plant height, , dry and fresh herb weights and total content of carbohydrate in herb comparing with the control one (untreated *Urtica pilulifera* plants). Khattab *et al*. (2016) detected that applying glycine at 75 mg/l, tryptophan at 300 mg/l or methionine at 150 mg/l, significantly improved the vegetative, corms and cormels and flowering parameters of rose supreme (*Gladiolus grandiflorus*) plants.

Therefore, this research aimed to improve vegetative characteristics, flowering and chemical parameters of *Dahlia pinnata* L., cut flowers through using the foliar application by some amino acid (Tryptophan, Arginine, Glycine and combination between them), beside the control one (untreated plants).

MATERIALS AND METHODS

This investigation was undertaken during the two consecutive seasons of 2017-2018 and 2018-2019 at the Baramoon Experimental Research Farm, Dakahlia Governorate, Hort. Res. Institute, Agric. Res. Center, Ministry of Agric., Egypt. This study aimed to evaluate the impact of preharvest treatments through using some amino acids as foliar usage on quality of *Dahlia pinnata* L. cut flowers (local variety).

Plant material

Dahlia pinnata L. tubers of a uniform size and shape were purchased from a commercial farm in EL-Kanater El-Khaireia city.

Planting process

The tubers were cultured on 25th October at 60 cm between plants and 80 cm between rows. The plants were conserved beneath normal conditions and irrigated as needed. Previous the planting process, the next fertilization process were applied per feddan: 70 kg calcium sulfate ($CaSO_4$) + 70 kg ammonium sulfate $(NH_4)2SO_4$ + 120 kg sulfur (SO_4) + 250 kg super phosphate calcium $[Ca(H_2PO_4)_2CaSO_4]$ + 12 m^3 farmyard manure + 25 m^3 sand. The experiment soil was analyzed at the beginning of the research by taking the soil samples from different parts of the field at 0-30 cm depth, prior supplying any soil fertilizers. Samples were quite mingled, and the soil was analyzed for its chemical and physical characters following the method of Jackson (1973). Data in Table (a) clear the chemical and physical characteristics of the used soil mixture in both seasons.

Table a. Chemical and physical analysis of the experimental soil used in the experiment in both seasons (2017) and 2018).

Soil properties	value	Soil properties	value
Physical		**Soluble anions (meq/L)**	
Coarse sand	7.70	CL^-	3.54
Fine sand	18.15	HCO_3^-	3.18
Silt	33.64	$CO_3^=$	0.00
Clay	40.51	$SO_4^=$	5.14
Texture	Clay-loam	Soluble cations (meq/L)	
Chemical		Ca^{++}	4.02
Organic matter (%)	1.89	Mg^{++}	1.33
$CaCO_3$	4.54	Na^+	1.19
E.C. (dsm^{-1} at 25º)	1.14	K^+	5.29
PH (1:2.5 w/v)	8.12	Available micronutrients (ppm)	
Total – N (%)	0.25	Fe	3.59
Available – P (ppm)	11.74	Mn	1.53
		Zn	1.37
		Cu	0.54

Amino acids treatments

All plants under study were treated two times as foliar application with tryptophan, arginine, glycine solely at the concentration of 100 ppm per each and combination between them at the same concentrations, plus the control. The first foliar application was done after one month from tubers foliage growth on December 5th and the second apply was after one month from the first addition on January 5th.

The treatments were as following

T1. Control (untreated).
T2. Tryptophan at 100 ppm.
T3. Arginine at 100 ppm.
T4. Glycine at 100 ppm.
T5. Tryptophan + Arginine + Glycine at 100 ppm per each.

Data recorded

All agriculture practices were followed as normal and the plants were harvested at 2nd June and 5th June in both seasons, respectively and the next data were listed:

A - Vegetative parameters

1. Plant height (cm): was recorded and measured at the harvest time from the soil top to the highest part of each plant.
2. Number of leaves /plants.
3. Branches number/plants: All the plants branches were calculated after flowering and the average branches number was calculated.
4. Stem diameter (cm**):** was determined before harvesting after 3rd leaf.

B - Flowering characters

1. Number of inflorescences were counted during three months from the beginning of flowering from the 25th of January till the end of April and the average number of inflorescences were counted.
2. Inflorescence fresh weight (g).

3. Inflorescence diameter: was determined by using a vernier caliper and expressed in (cm).
4. Inflorescence stem length (cm).

C- Chemical composition:

1. Chlorophyll content (mg/g F.W): was estimated on 5th leaves from the plant apex according to Sadasivam and Manickam, (1996).
2. Carbohydrate content in leaves and flowers (mg /g DW): was taken from the 3rd leaf of the plant base from six plants per each treatment to determine total carbohydrates in dry leaf stem according to Sadasivam and Manickam, (1996).
3. NPK contents (%): was taken from mature leaves of each treatment. Leaf petioles were cleaned and dried at 70 ºC to constant weight and finally grind. Nitrogen (N) was determined according to (Nelson and Sommers, 1980). Phosphorus (P) was estimated according to (Jakson, 1967). Potassium (K) was determined using flame photometer according to (Brown and Lilliand, 1946).

Statistical analysis:

The experiment layout was A complete randomized block design with three replicates for each treatment. Since the amino acid treatments were five x three replicates x two rows/replicate x 9 plants/ row = 270 plants were grown in 525 m^3 experiment space. Then data were subjected to analysis of variance (ANOVA) using the costate program and the methods of least significance differences (L.S.D) test at 5% probability was used for comparing among the different means according to Snedecor and Cochran (1990).

RESULTS AND DISCUSSION

1. Influence of amino acids on vegetative growth

Data showed in Tables (1 & 2) and Figs. (1, 2, 3 & 4) revealed that there was a significant difference in all vegetative characteristics (plant height, branches number/plant, stem diameter and leaves number/plant) affected by different types of amino acids treatments on dahlia plants. It is evident from these data that the plants sprayed with the amino acids mixture (tryptophan + arginine + glycine at 100 ppm) produced the superior values of tallest plants (81.1 and 86.0 cm), the maximum branches number /plant (11.0 and 13.0), the largest leaves number/plant (41.0 and 51.2) and the largest stem diameter (2.28 and 2.72 cm). In addition, plants sprayed with arginine then glycine treatment in both seasons, respectively with no differences between them.

Table 1. Influence of amino acids on plant height and branches number of dahlia plants during 2017 and 2018 seasons.

Treatments	Plant height (cm) 1st season	Plant height (cm) 2nd season	Mean	Branches number/ plant 1st season	Branches number/ plant 2nd season	Mean
Control (untreated plants)	48.4	50.6	49.5	3.0	3.2	3.1
Tryptophan at 100 ppm	73.9	76.7	75.3	3.0	3.7	3.4
Arginine at 100 ppm	81.1	83.9	82.5	7.0	7.6	7.3
Glycine at 100 ppm	73.9	78.1	76.0	6.0	6.7	6.4
Mix at 100 ppm	81.1	86.0	83.6	11.0	13.0	12.0
LSD at 5 %	2.84	4.65	----	0.85	1.15	----

Table 2. Influence of amino acids on leaves numbers and stem diameter of dahlia plants during 2017 and 2018 seasons.

Treatments	Leaves number/plant 1st season	Leaves number/plant 2nd season	Mean	Stem diameter(cm) 1st season	Stem diameter(cm) 2nd season	Mean
Control (untreated plants)	22.0	25.3	23.7	0.87	1.10	1.00
Tryptophan at 100 ppm	30.0	31.7	30.9	1.18	1.57	1.38
Arginine at 100 ppm	35.0	37.6	36.3	1.94	2.01	1.98
Glycine at 100 ppm	32.0	33.3	32.7	1.76	1.87	1.82
Mix at 100 ppm	41.0	51.2	46.1	2.28	2.72	2.50
LSD at 5 %	4.031	5.124	----	0.109	0.189	----

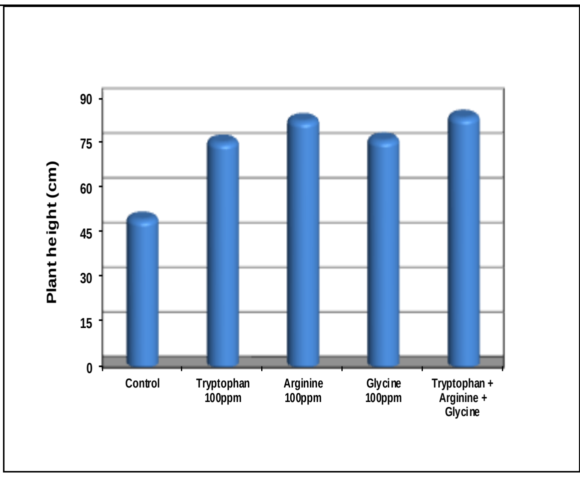

Fig. 1. Influence of amino acids on plant height of dahlia plants as a mean of two seasons.

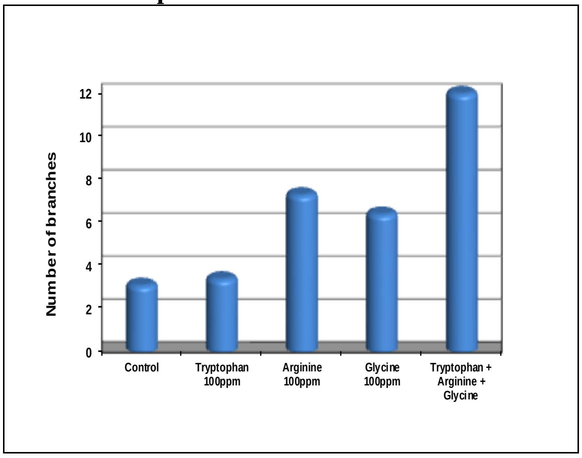

Fig. 2. Influence of amino acids on branches number of dahlia plants as a mean of two seasons.

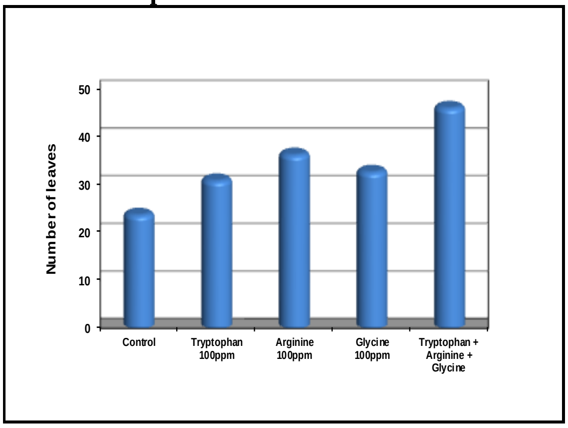

Fig. 3. Influence of amino acids on leaves number of dahlia plants as a mean of two seasons.

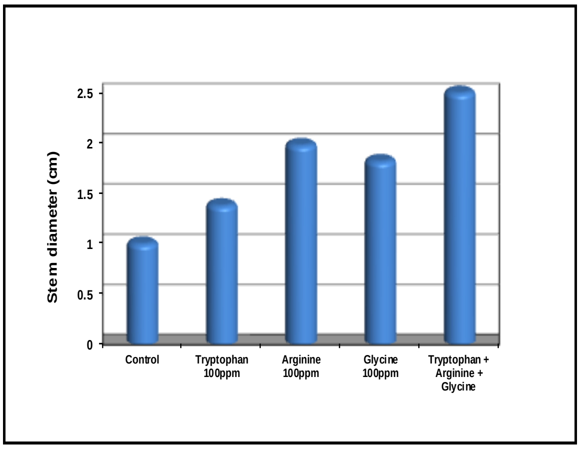

Fig. 4. Influence of amino acids on stem diameter of dahlia plants as a mean of two seasons.

While, the least values of vegetative growth characters obtained from plants did not receive any amino acids treatments (control) in both seasons (48.4 and 50.6 cm) for plant height, (3.0 and 3.2) for No. of branches/plant, (22.0 and 25.3) for No. of leaves/plant and (87.0 and 1.10 cm) for stem diameter.

This increment in vegetative growth parameters because of spraying amino acids may be due to the important of amino acids on increasing photosynthesis of dahlia plant. This investigation obviously confirmed that there was positive relationship between the different amino acids foliar spray at 100 ppm and the generality vegetative characteristics of dahlia (*Dahlia pinnata* L.) plant. The superior vegetative characters and plant development were recorded when plants were applied by the foliar spray of amino acids. Since, the amino acids could affect on gibberellins biosynthesis (Maxwell and Kieber, 2004).

The beneficial effect of amino acids was emphasized by Zedan (2000) on *Carum carvi* and *Coriandrum sativum* plants; El-Fawakhry and El-Tayeb (2003) on chrysanthemum plants; Abo-Dahab and Abd El-Aziz (2006) on *Philodendron erubescens* plants; Gamal El-Din *et al*. (2005) on chamomile plant; Abd El-Aziz *et al*. (2007) on *Syngonium podophyllum* L. plants; Abd El-Aziz and Balbaa (2007) on *Salvia farinacea* plants; Abdel Aziz *et al*. (2009) on gladiolus plants; Mahgoub *et al*. (2011) on *Dahlia pinnata* plants and Wahba *et al*. (2015) revealed that applying the mixture of amino acid significantly promoted the growth parameters (plant height) compared to untreated plants of *Urtica pilulifera.*

2. Influence of amino acids on flowering characteristics

Data recorded in Tables (3 & 4) and Figs. (5, 6, 7 & 8) showed the effect of foliar spraying of amino acids treatments on flowering characters (number of inflorescences /plant, inflorescence fresh weight, inflorescence diameter and inflorescence stem length) of dahlia plants. These results revealed that the mixture treatment of amino acids was significantly effective than the individual treatments for increasing the flowering characters. The maximum number of inflorescences /plant was (63.0 and 66.6 flowers), inflorescence fresh weight /plant (15.59 and 16.70 g /plant), inflorescence diameter (12.3 and 12.6 cm) and inflorescence stem length (34.6 and 36.5 cm) from those applied with the amino acids mixture (tryptophan + arginine + glycine) at 100 ppm respectively, in both seasons.

Table 3. Influence of amino acids on number of inflorescences and inflorescences fresh weight of dahlia plants during 2017 and 2018 seasons.

Treatments	Inflorescence number		Mean	Inflorescence fresh weight (g)		Mean
	1st season	2nd season		1st season	2nd season	
Control (untreated plants)	35.0	37.3	36.2	7.53	7.41	7.47
Tryptophan at 100 ppm	47.0	49.3	48.2	8.28	8.70	8.49
Arginine at 100 ppm	54.0	54.7	54.4	12.59	12.85	12.68
Glycine at 100 ppm	57.0	58.3	57.7	11.90	12.21	12.06
Mix at 100 ppm	63.0	66.6	64.8	15.59	16.70	16.15
LSD at 5 %	3.77	5.31	----	1.28	1.89	----

Table 4. Influence of amino acids on inflorescence diameter and inflorescence stem length of dahlia plants during 2017 and 2018 seasons.

Treatments	Inflorescence diameter (cm)		Mean	Inflorescence stem length (cm)		Mean
	1st season	2nd season		1st season	2nd season	
Control (untreated plants)	6.5	6.7	6.6	19.5	20.3	19.9
Tryptophan at 100 ppm	8.4	8.5	8.5	24.7	25.5	25.1
Arginine at 100 ppm	10.6	10.8	10.7	28.4	28.7	28.6
Glycine at 100 ppm	9.6	9.9	9.8	26.4	26.6	26.5
Mix at 100 ppm	12.3	12.6	12.5	34.6	36.5	35.6
LSD at 5 %	0.25	0.23	----	2.25	1.89	----

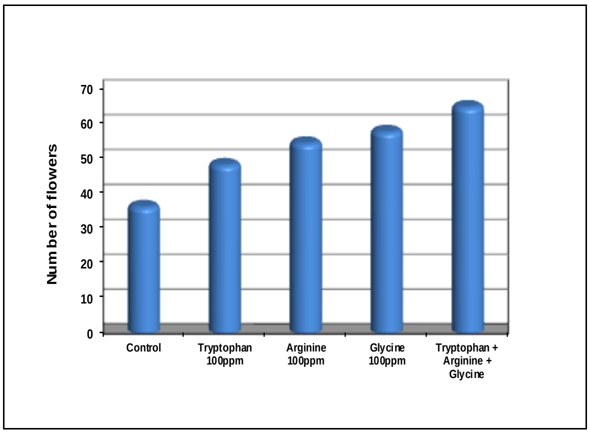

Fig. 5. Influence of amino acids on No. of inflorescences of dahlia plants as a mean of two seasons.

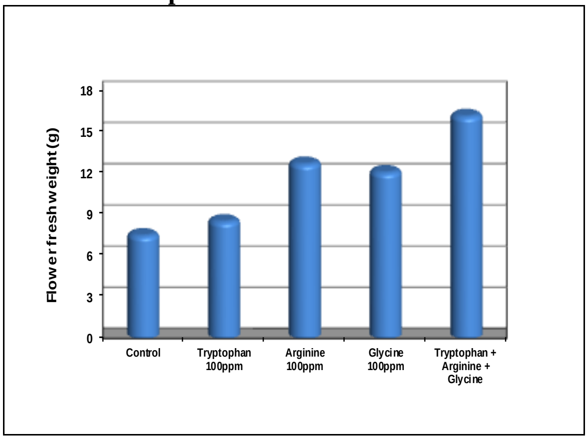

Fig. 6. Influence of amino acids on inflorescences fresh weight of dahlia plants as a mean of two seasons.

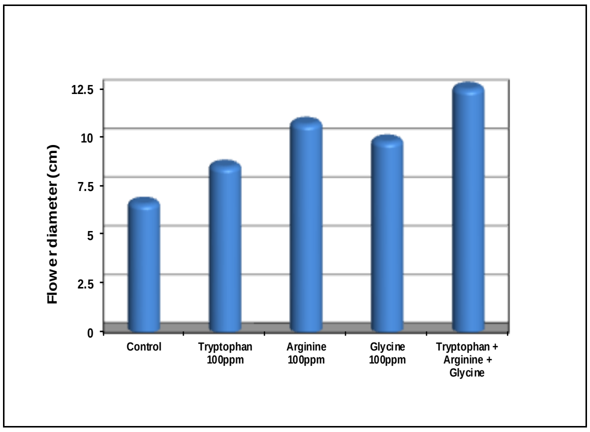

Fig. 7. Influence of amino acids on inflorescence diameter of dahlia plants as a mean of two seasons.

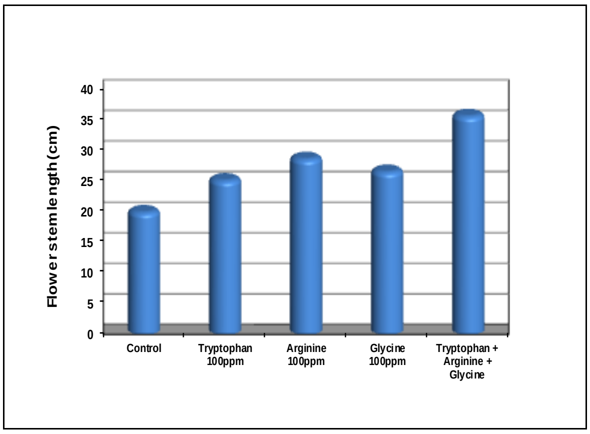

Fig. 8. Influence of amino acids on inflorescence stem length of dahlia plants as a mean of two seasons.

On the other hand, plants sprayed with individual amino acids (glycine) gave the highest number of inflorescences /plant (57.0 and 58 .3 flower) followed by (54.0 and 54.7 flower) from plants treated with arginine respectively, in both seasons. The results revealed that the heaviest inflorescences fresh weight (12.59 and 12.85 g), inflorescences diameter(10.6 and 10.8 cm) and inflorescences stem length (28.4 and 28.7 cm) resulted from plants treated with arginine at 100 ppm in two seasons, respectively. On the other side, the least of flowering characters were recorded from the control plants in both seasons.

Consequently, the GA_3 encouraged increment of internode development could be consequential to their influence on promoting the cell expansion, cell division or both (Callebaut *et al*. 1982). The stimulating amino acids effects are linked to increment in activity and contents of the endogenous provider like IAA and GA_3 which are recognized as plant growth regulators (Wilkins, 1989). Moreover, glycine is created from serine utilizing the enzyme serine. The enzyme efficiently tears out the hydroxyl group of serine and exchanges it by a methyl group to produce glycine. This response is the lonesome path for *E. coli* to create the glycine. Moreover, the complete mechanization has so far to be explained (Steiert *et al*., 1990). For detail, amino acids promote the cell division in addition to control and optimize the water relations especially the water uptake (Chen *et al*., 2004).
In statement, amino acids encourage the plant development and growth by improving the assimilation of the main enzyme activation, elements and/or suppression, modification in protein synthesis, the cell membrane permeability and eventually the activation of biomass manufacture and proposed that their contents may be vital for regulating plant growth and develop (Ulukan, 2008).

The obtained results are confirmed by the findings of El-Naggar and Abd El-Hafez (2011) on *Gladiolus gandavensis* plants; Mahgoub *et al.* (2011) on *Dahlia pinnata* plants and Geshnizjani and Khosh-Khui (2016) on *Gerbera jamesonni* L.

3. Influence of amino acids on the chemical analysis

1. Chlorophyll content (mg/g F.W)

In connection with the chlorophyll content in dahlia leaves down influence of spray with amino acids in both seasons presented in Table (5). Data cleared that applying dahlia plants by amino acid spraying had significant effectiveness on the chlorophyll A, chlorophyll B and total chlorophyll contents in the two seasons. Treatment with mixture of amino acids tryptophan + arginine + glycine gave the maximum chlorophyll a, b and total chlorophyll values, followed by arginine treatment then the tryptophan treatment, whereas untreated plants (control plants) gave a minimum values of chlorophyll a, b and total in both seasons, respectively. Besides that, the interior chemical contents of dahlia were influenced invariably by amino acids applying at 100 ppm.

Table 5. Influence of amino acids on chlorophyll A, B and total chlorophyll (mg/g F.W) of dahlia plants during 2017 and 2018 seasons.

Treatments	Chlorophyll A (mg/g F.W)		Mean	Chlorophyll B (mg/g F.W)		Mean	Total chlorophyll (mg/g F.W)		Mean
	1st season	2nd season		1st season	2nd season		1st season	2nd season	
Control (untreated plants)	0.598	0.604	0.601	0.420	0.424	0.422	1.018	1.020	1.019
Tryptophan at 100 ppm	0.637	0.647	0.642	0.447	0.457	0.452	1.083	1.087	1.085
Arginine at 100 ppm	0.659	0.666	0.663	0.459	0.463	0.461	1.118	1.122	1.120
Glycine at 100 ppm	0.617	0.624	0.621	0.432	0.446	0.439	1.050	1.052	1.051
Mix at 100 ppm	0.681	0.689	0.685	0.471	0.512	0.492	1.152	1.201	1.177
LSD at 5 %	0.014	0.010	----	0.016	0.018	----	0.018	0.017	----

The chlorophyll content which improved by applying amino acids may be as a result of increasing evacuation of alpha-ketogelutaric acid from Krebs cycle (Farshid *et al*., 2013).

Also, these results are confirmed by the findings of Tejada and Gonzalez (2003) on *Asparagus officinalis* plants, Abo-Dahab and Abd El-Aziz (2006) on *Philodendron erubescens* plants, Ali and Hassan (2013) on *Tagetes erecta* plant.

2. Carbohydrates (%)

Concerning carbohydrates percentage in dahlia leaves and flowers down influence of amino acids foliar applications in both seasons the data presented in Table (6). Data obviously explained that all amino acids foliar spraying significantly increased the content of carbohydrates percentage in the both seasons. Mixture treatment of amino acids foliar spraying produced the maximum carbohydrates values (39.15 and 40.81 %) in leaves and (19.63 and 22.77 %) in flowers respectively, in the two seasons followed by (38.28 and 39.37 %) and (19.34 and 21.45 %) resulted from leaves and flowers by arginine treatment in both seasons, respectively. The least values (35.72 and 37.72 %) and (18.61 and 18.322 %) resulted from leaves and flowers by the control plants in both seasons, respectively.

Table 6. influence of amino acids on carbohydrates (%) in leaves and flowers of dahlia plants during 2017 and 2018 seasons.

Treatments	Carbohydrates in leaves (%)		Mean	Carbohydrates in flowers (%)		Mean
	1st season	2nd season		1st season	2nd season	
Control (untreated plants)	35.72	37.72	36.72	18.61	18.32	18.47
Tryptophan at 100 ppm	37.34	38.01	37.68	19.06	19.15	19.11
Arginine at 100 ppm	38.28	39.37	38.83	19.34	21.45	20.40
Glycine at 100 ppm	36.54	37.88	37.21	18.87	19.96	19.42
Mix at 100 ppm	39.15	40.81	39.98	19.63	22.77	21.20
LSD at 5 %	0.403	1.122	----	0.268	0.431	----

Similar results reported by Abd El-Aziz *et al.* (2009) on *Gladiolus grandflorum* L. plant and Wahba *et al.* (2015) on *Urtica pilulifera* plants.

3. NPK content (%)

The NPK percentage in leaves of dahlia plants is presented in Table (7). It could be notice that there was a significant difference in NPK percentage in leaves of dahlia plants treated with the different types of amino acids. Plants sprayed with amino acids mixture (tryptophan + arginine + glycine) at 100 ppm gave the highest values of NPK % (2.42 and 2.46 % N), (0.29 and 0.29 % P) and (2.79 and 2.84 % K) followed by arginine treatment at 100 ppm (2.30 and 2.33 % N), (0.27 and 0.27 % P) and (2.58 and 2.64 % K). While, the lowest values of NPK % in dahlia plants (1.89 and 1.92 % N), (0.21 and 0.24 % P) and (2.15 and 2.17 % K) resulted from control plants respectively, in both seasons.

Table 7. Influence of amino acids on N, P and K contents (%) in leaves of dahlia plants during 2017 and 2018 seasons.

Treatments	N (%)		Mean	P (%)		Mean	K (%)		Mean
	1st season	2nd season		1st season	2nd season		1st season	2nd season	
Control (untreated plants)	1.89	1.92	1.91	0.21	0.24	0.21	2.15	2.17	2.16
Tryptophan at 100 ppm	2.18	2.25	2.22	0.25	0.25	0.25	2.36	2.38	2.37
Arginine at 100 ppm	2.30	2.33	2.32	0.27	0.27	0.27	2.58	2.64	2.61
Glycine at 100 ppm	2.02	2.06	2.04	0.23	0.28	0.23	2.41	2.45	2.43
Mix at 100 ppm	2.42	2.46	2.44	0.29	0.29	0.29	2.79	2.84	2.82
LSD at 5 %	0.09	0.08	----	0.03	0.02	----	0.11	0.14	----

Increasing NPK percentage in dahlia leaves are in harmony with those of El-Naggar and Abd El-Hafez (2011) they reported that amino acid “tryptophan” increased the content of N, P and K in leaves. Moreover, these increases were enhanced gradually by increasing amino acid “tryptophan” concentrations up to 200 ppm.

It could be recommended that to obtain the best vegetative growth (plant height, number of flowers /plants, flowers fresh weight and flowers diameters) they might be sprayed with mixture of amino acids (tryptophan, arginine and glycine) at 100 ppm.

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تأثير بعض الأحماض الأمينية على صفات النمو الخضرى والإزهار والمحتوى الكيماوى لنبات الداليا كأزهار قطف

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تم إجراء هذا البحث علي نبات الداليا بمزرعة محطه بحوث البساتين بالبرامون - المنصوره – مركز البحوث الزراعيه وذلك خلال الموسمين الزراعيين المتتاليين (٢٠١٧ / ٢٠١٨) و(٢٠١٨ /٢٠١٩). يهدف البحث الي دراسه صفات النمو الخضري وصفات الازهاروالصفات الكيماويه لنباتات الداليا باستخدام الرش الورقى ببعض الاحماض الامينيه (الارجنين - الجليسين - التربتوفان ومخلوط منهم بتركيز ١٠٠ جزء في المليون) بالإضافة إلى معاملة الكنترول (بدون رش) . ويمكن تلخيص أهم النتائج المتحصل عليها كما يأتى:جميع صفات النمو الخضرى والأزهار لنبات الداليا تأثرت بالرش بالأحماض الأمينية سواء بالصورة الفردية أو في صورة مخلوط الأحماض. حيث أنتجت المعاملة بمخلوط الاحماض الامينية بتركيز ١٠٠ جزء في المليون أعلى القيم بالنسبة الي طول النبات (٨١,١ – ٨٦,٠ سم) وعدد الازهار (٦٣,٠ – ٦٦,٦ زهرة) وقطر الزهرة (١٢,٣- ١٢,٦ سم) وطول الشمراخ الزهري (٣٤,٦- ٣٦,٥ سم) ومحتوي النبات من الكلوروفيل والنسبة المئوية للكربوهيدرات الكلية والنتروجين والفوسفور والبوتاسيوم في موسمي الزراعة علي التوالي. كما سجلت معاملة الجليسين زيادة معنوية في قيم عدد الازهار للنبات بينما سجلت معاملة الارجينين قيم عالية بالنسبة لباقي الصفات الخضرية والزهرية خلال موسمى الدراسة علي التوالى مقارنة مع المعاملات الأخرى. كما سجلت أقل القيم بمعاملة الكنترول (بدون رش) فى كلا الموسمين على التوالى. وبالتالي نوصي برش نباتات الداليا بمعاملة المخلوط من الاحماض الامينية (تربتوفان – ارجينين – جليسين) بتركيز ١٠٠ جزء في المليون حيث تبدو أكثر ملائمة لإعطاء محصول ذو صفات جيدة من الازهار يليه معاملة الجليسين تحت ظروف هذه التجربة.